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What is their spy-in-the-sky trying to do?

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As reported by Craig Covault in *Aviation Week & Space Technology* earlier this month, the largest spy satellite ever to be placed in orbit — the Soviet Cosmos 1603 — was lost to U.S. Air Force tracking radar for as long as several hours last fall.

This highly maneuverable space platform weighs as much as a small school bus and was launched on the world's most powerful rocket, the SL-12 Proton. It had eluded for a time the global radar trackers of GEODSS (Ground-based Electro-Optical Deep Space Surveillance) of the USAF's North American Aerospace Defense Command (NORAD), part of that base's Strategic Communications Division (SCD).

The seemingly embarrassing incident, involving such a huge Cosmos spy-in-the-sky, it turns out, was not unusual in itself. Space surveillance tracking is not foolproof, even with all the air- and space-borne sensors, computers, ground reconnaissance on a world scale, and human-intelligence evaluators to which "orbiting space objects" are subjected by NORAD's SCD.

Furthermore, as any space object, such as the Cosmos, circles the earth, it temporarily exits from one radar-covered area before it enters the next. During these space/time segments of fan-shaped "blindness," and especially if the satellite unpredictably alters course or altitude (the latter of which means it also changes speed), it may be hard immediately to pick up the object again by a subsequent radar contact.

According to informed sources, this has happened on numerous occasions in the past — even in a communications system that is regarded as superior to any other country's, including that of the Soviet Union. For instance, early last year, one of our own communications satellites, Westar, was "lost" for 20 hours.

USAF space trackers say that they must verify no less than 4,500 objects at any one time, from orbiting "junk" like cameras, nuts and bolts, and parts of ejected rocket boosters and canisters, to some 1,500 objects that are in orbit above 5,555 kilometers and beyond the range of most of NORAD's radar systems, according to senior officers at the Strategic Air Command near Omaha. Even a huge object like Cosmos 1603 can and did elude radar intermittently.

The principal reason for the Cosmos incident, however, is said by NORAD to have been that the Soviets had done a "most unusual thing," as one official described it. This heaviest spy satellite ever launched did not simply go into a normal orbital trajectory when launched from its booster at the end of September. Instead, its upper-stage booster engine, which the satellite carried with it for a time, fired at least twice, sending the several-thousand-ton satellite into varying orbits, known as "plane changes." These changes, in the form of angles measured off the equatorial plane, permitted Cosmos 1603 to crisscross its target — the United States — on different "ground tracks."

Some of these tracks, according to NORAD as reported in *Aviation Week & Space Technology*, carried the spy satellite over the Northeast and Washington, D.C., area, others over California and the American Southwest, where major research laboratories engaged in hush-hush space-related R&D are located. Presumably, the Cosmos is equipped with electronic monitoring equipment, known as "elint" (electronic intelligence), that can eavesdrop on electronic pulsations and other signals produced by high- or low-frequency transmissions from computers and other equipment used in laboratory work or in the testing of new U.S. space technology.

Moscow, obviously, would like to know as much as possible about the progress of R&D on the Strategic Defense Initiative, the U.S. catch-up program and rough equivalent of the Soviets' longer-standing "star wars" R&D and that country's already partly deployed space offense/defense system composing what the Soviets call "PKO," Sovietese for "space defense."

Beyond the elint function of Cosmos 1603, some officials contacted by this columnist expressed a degree of curiosity about "what else" the Soviet space vehicle may have been intended to do. One official noted that the vehicle was "grossly outsized" for its putative spy mission, even given all the equipment it would have to carry. But especially puzzling was the propulsion capacity the package carried.

Beyond maneuvering it so suspiciously in the plane changes, why was so much power carried aloft?

One hypothesis offered was that the Soviets might have been testing an additional function beyond spying: e.g., the FOBS (Fractional Orbiting Bomb Satellites). These are strictly prohibited (by treaty) re-entry vehicles, similar to warheads carried on ICBMs, that are launched from an orbiting platform. According to one source: "They gain an element of surprise that ICBMs cannot achieve."

Although FOBS are illegal, the Soviets could "break out" of previous agreements quickly in the case of FOBS, especially if they had already tested the heavy platforms necessary for using FOBS.

Presumably, FOBS platforms not only would have to be boosted into orbit, but their orbits changed to elude enemy ground trackers. Cosmos 1603 might fit the bill as a "dry run" for such a deadly, outlawed system. A NORAD spokesman observed that Soviet FOBS-related testing had "not been heard of" for several years. Still, no one contacted by this columnist summarily ruled out the possibility, even if remote and unproved, that the Soviets could resume FOBS testing.

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Finally, the Soviets are known to be pursuing the orbiting of a gigantic space-deployed "battle station." Its already-large Salyut 7 vehicle seems intended eventually to serve as such a permanently orbiting battle station. Such stations would act like the "revolving artillery base" our natural moon was expected to become, were it used militarily, when lunar exploration first began 20 years ago. However, with a near-Earth (cis-terrestrial) "moon," a kind of space "super-aircraft carrier" could be created.

This would take the form of a battle station bristling with space-capable weaponry. It would actually be preferable to our natural satellite, which is some 250,000 miles distant. Nor, of course, can the moon's orbit be changed artificially, as can an artificial space vehicle's. A great advantage for the latter in zeroing in on earth targets.

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